

What is claimed is:

1. In a controlled linear actuator system (300,400,500,600) for actuation of a friction clutch (20) having a housing, control fingers (21), and a clutch axis (301,401,501,601), the actuator system is characterized by:
  - 5 a screw drive (310,410,510,610) generally coaxial with the clutch axis and including a collar (312,412,512,612) and a screw (311,411,511,611), said screw fastened to the housing;
  - a friction plate (303,403,503,603) arranged generally coaxial with the clutch
  - 10 axis and fastened to the control fingers for rotation therewith;
  - said collar having an associated first bearing race (322,422,522,622) with a bearing race axis offset from the clutch axis;
  - a second bearing race (321,421,521,621) in frictional engagement with said friction plate; and
  - 15 a plurality of bearings associated with said first and second bearing races.
2. In a controlled linear actuator system (300,400,500,600) for actuation of a friction clutch (20) having a housing, control fingers (21), and a clutch axis (301,401,501,601), the actuator system is characterized by:
  - a screw drive (310,410,510,610) generally coaxial with the clutch axis and
  - 20 including a collar (312,412,512,612) and a screw (311,411,511,611), said screw fastened to the housing;
  - a friction plate (303,403,503,603) fastened to the control fingers for rotation therewith;
  - said collar having an associated first bearing race (322,422,522,622) with a
  - 25 bearing race axis (302,402,502,602) generally coaxial with the clutch axis;
  - said friction plate having a friction plate axis (302,402,502,602) offset from the clutch axis and having an associated second bearing race (321,421,521,621) in frictional engagement therewith; and
  - a plurality of bearings (323,423,523,623) associated with said first and
  - 30 second bearing races.

3. The actuator system according to claims 1 or 2, wherein the screw drive has a continuously variable pitch.

4. In an actuator system (300,400,500,600) for actuating a clutch (20), the clutch having a clutch axis (301,401,501,601), a friction disc and a pressure plate, the pressure plate having control fingers (20) for engaging and releasing the pressure plate, the actuator system is characterized by:

a screw drive assembly (310,410,510,610), said screw drive assembly having a screw drive assembly axis;

a friction plate (303,403,503,603) operatively connected to the control fingers for rotation therewith, said friction plate having a friction plate axis;

a bearing assembly (320,420,520,620) operatively connected to said friction plate and to said screw drive assembly; said bearing assembly having a bearing assembly axis; and

at least one of said friction plate axis, said screw drive assembly axis, or said bearing assembly axis being offset from the clutch axis.

5. The actuator system according to claim 4, wherein said offset is constant.

6. The actuator system according to claim 4, wherein said offset is variable.

7. The actuator system according to claim 4, wherein said screw drive assembly is a ball ramp.

8. The actuator system according to claim 4, wherein said bearing assembly is intermediate said friction plate and said screw drive assembly.

9. The actuator system according to claim 4, wherein said friction plate axis is offset from the clutch axis.

10. The actuator system according to claim 4, wherein said bearing assembly axis is offset from the clutch axis.

11. The actuator system according to claim 4, wherein said bearing assembly has a first race and a second race, said second race being in frictional engagement with said friction plate.

12. The actuator system according to claim 4, wherein said screw drive

assembly axis is offset from the clutch axis.

13. The actuator system according to claim 12, wherein said bearing assembly axis is offset from the clutch axis.

14. The actuator system according to claim 4, wherein said bearing  
5 assembly includes a friction ring.

15. The actuator system according to claim 14, wherein said friction ring is made of a dry friction material.

16. The actuator system according to claim 14, wherein said friction ring is made of a PTFE-based metal-polymer material.

10 17. The actuator system according to claim 14, wherein said friction ring is made of a graphite material.

18. The actuator system according to claim 4, wherein said screw drive assembly includes a screw and collar, said screw having a pitch other than zero.

15 19. The actuator system according to claim 18, wherein said screw pitch is constant.

20. The actuator system according to claim 18, wherein said screw pitch is variable.

21. The actuator system according to claim 18, wherein said screw drive assembly includes a plurality of balls intermediate to said screw and said collar.

20 22. The actuator system according to claim 21, wherein said collar includes spiral grooves.

23. The actuator system according to claim 4, further including a worm gear reduction assembly operatively connected to said screw drive assembly.

24. The actuator system according to claim 23, wherein said worm gear  
25 reduction assembly includes a worm and a gear.

25. The actuator system according to claim 24, wherein said screw drive assembly includes a collar.

26. The actuator system according to claim 25, wherein said worm gear reduction assembly includes a housing that at least partially surrounds said collar.

30 27. The actuator system according to claim 25, wherein said gear is fastened to said collar.

28. The actuator system according to claim 25, wherein said gear is machined in said collar.

29. The actuator system according to claim 25, further comprising a shaft operatively connected to said worm.

5 30. The actuator system according to claim 29, further comprising a motor operatively connected to said shaft.

31. In an actuator system (300,400,500,600) for actuating a clutch (20), the clutch being intermediate to an engine (10) and a gearbox (11), the clutch having a clutch axis (301,401,501,601), a friction disc and a pressure plate, the pressure  
10 plate having control fingers (21) for engaging and releasing the pressure plate, the actuator system is characterized by:

a friction plate (303,403,503,603) operatively connected to the control fingers for rotation therewith, said friction plate having a friction plate axis;

15 a screw drive assembly (310,410,510,610) having a screw drive assembly axis, said screw drive assembly including a flange operatively connected to the gearbox and said screw drive assembly further including a screw (311,411,511,611) and a collar (312,412,512,612);

20 a worm gear reduction assembly (330,430,530,630) having a worm (331,431,531,631) and a gear (332,432,532,632), said gear operatively connected to said collar of said screw drive assembly;

25 a bearing assembly (320,420,520,620) having a first bearing race (322,422,522,622) and a second bearing race (321,421,521,621), said first bearing race operatively connected to said screw and said second bearing race operatively connected to said friction plate, said bearing assembly having a bearing assembly axis; and

at least one of said friction plate axis, said screw drive assembly axis, or said bearing assembly axis being offset from the clutch axis.

32. The actuator system according to claim 31, said offset creating a first torque biasing said screw drive assembly in a first direction.

30 33. The actuator system according to claim 32, said offset creating a second torque biasing said screw drive assembly in a second direction.

34. The actuator system according to claim 33, wherein said first torque is balanced with said second torque.

35. The actuator system according to claim 34, said worm gear reduction assembly mediating axial travel of said friction plate.